



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,042	07/28/2003	Richard Chin	PD-02W229	7393
23915	7590	10/13/2005		
PATENT DOCKET ADMINISTRATION RAYTHEON SYSTEMS COMPANY P.O. BOX 902 (E1/E150) BLDG E1 M S E150 EL SEGUNDO, CA 90245-0902			EXAMINER HANNAHER, CONSTANTINE	
			ART UNIT 2878	PAPER NUMBER

DATE MAILED: 10/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/629,042

Applicant(s)

CHIN ET AL.

Examiner

Constantine Hannaher

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on September 26, 2005. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 and 6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Wood (US005420419A).

With respect to independent claim 1, Wood discloses a system (Fig. 1) for stabilizing the temperature of a detector array 30 (Fig. 2) comprising one or more video reference pixels (column 4, lines 37-48) adapted to output a reference signal *t* which is responsive to the temperature of the detector array 30 and means 20 for adjusting the temperature of the detector array 30 based on the reference signal *t*.

With respect to dependent claim 2, the video reference pixels in the system of Wood are constructed in the recited location (column 4, lines 37-48).

With respect to dependent claim 3, the video reference pixels in the system of Wood are constructed in the recited manner (column 4, lines 37-48).

With respect to dependent claim 6, the means for adjusting temperature 20 in the system of Wood includes a thermoelectric cooler of the recited type (column 4, lines 12-21).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 4, 5, 7-11, 14-21, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood (US005420419A).

With respect to dependent claims 4 and 5, Wood does not identify the specific manner in which the microbolometers serving as temperature sensors in the array **30** “are intentionally made unresponsive to infrared radiation” but it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the requirement of Wood by shielding (as by placing a layer on the window **40** or positioning a structure above the microbolometer) or thermal sinking to the substrate (as by omitting the legs in a bolometric bridge arrangement) since these are well-known expedients for creating “dummy” pixels which are not responsive to incident radiation.

With respect to dependent claim 7, the means 20 for adjusting temperature in the system of Wood further includes a source 73 of signals t_a , t_b which are applied to the thermoelectric cooler in response to a control signal developed therein. It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify that the signals from element 73 were a “current” since this is a normal way of transmitting electrical power over wires as are found in the system of Wood. Accordingly, element 73 is considered to represent a current driver.

With respect to dependent claim 8, the means 20 for adjusting temperature in the system of Wood further includes a processor running a control algorithm which outputs a control signal to the current driver 73 in response to the reference signal t in view of the desire of Wood to implement software control (column 3, lines 30-37).

With respect to dependent claim 9, the system of Wood further includes an analog to digital converter 78 which digitizes the output of the pixels in the array 30. Since the video reference pixels in the system of Wood are polled in the same way as the rest of the array and the “temperature data is sent to the image processor in the same way as the microbolometer signals” (column 4, lines 41-43) it would have been obvious to one of ordinary skill in the art at the time the invention was made that the means 20 for adjusting temperature in the system of Wood further included an analog to digital converter which digitized the output of the video reference pixels for input to the processor even if Fig. 1 does not illustrate such a route for the signals t .

With respect to dependent claim 10, in view of the known operation of thermoelectric cooler 20 and the application of signals t_a , t_b over power leads “-” and “+” it would have been obvious to one of ordinary skill in the art at the time the invention was made that any algorithm implementing the function of element 73 in the system of Wood must necessarily make the recited calculation.

With respect to dependent claim 11, in view of the description at column 2, lines 43-50 it would have been obvious to one of ordinary skill in the art at the time the invention was made that any algorithm implementing the function of element 73 in the system of Wood must necessarily make the recited comparison.

With respect to dependent claim 14, since the "temperature data is sent to the image processor in the same way as the microbolometer signals" (column 4, lines 41-43) it would have been obvious to one of ordinary skill in the art at the time the invention was made that the reference signal from the video reference pixels was multiplexed with signals from the detector array 30.

With respect to independent claim 15, see the explanation of the rejection against claims 1, 9, 8, 6, and 7.

With respect to dependent claim 16, see the explanation of the rejection against claim 2.

With respect to dependent claim 17, see the explanation of the rejection against claim 3.

With respect to dependent claim 18, see the explanation of the rejection against claim 4.

With respect to dependent claim 19, see the explanation of the rejection against claim 5.

With respect to dependent claim 20, see the explanation of the rejection against claim 10.

With respect to dependent claim 21, see the explanation of the rejection against claim 11.

With respect to dependent claim 24, see the explanation of the rejection against claim 14.

With respect to independent claim 25, Wood suggests a method for stabilizing the temperature of a detector array 30 corresponding to the illustrated system (Fig. 1) which would comprise the steps of obtaining a reference signal t indicative of the temperature of the detector array 30 using one or more video reference pixels (column 4, lines 37-48), calculating the amount of current t_a , t_b which should be sent to a thermoelectric cooler 20 in order to maintain the detector array 30 at a desired temperature level ("stabilization temperature") based on the reference signal t

(see the explanation of the rejections against claims 6-8 and 10) and sending the calculated amount of current to a thermoelectric cooler 20 adapted to adjust the temperature of the detector array 30.

7. Claims 12, 13, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood (US005420419A) as applied to claims 8 and 15 above, and further in view of Zhenduo *et al.* (US 20040098145A1).

With respect to dependent claims 12 and 22, Wood discloses that the algorithms used in the software control are required to be different at different instants in time (column 3, lines 33-35). From this, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the different algorithms described by Wood represented multiple types of controllers (with each different algorithm applicable to a different instant of time representing a type of controller). Zhenduo *et al.* confirms that a model based predictive control (control algorithm) used for temperature stabilization includes multiple dynamic models (types of controllers) (paragraph [0014]). In view of the fast temperature stabilization with little or no temperature overshoot as suggested by Zhenduo *et al.* (paragraph [0003]) it would have been obvious to one of ordinary skill in the art to implement the software control of element 73 in the system of Wood by including multiple types of controllers.

With respect to dependent claims 13 and 23, one or more elements of the model based predictive control (Fig. 12) of Zhenduo *et al.* represent a selector that chooses which dynamic model to use based on the reference signal (actual temperature P_d) and how close it is to a pre-determined set-point (setpoint temperature $P_{d\text{set}}$) (paragraphs [0097] and [0119]).

Response to Submission(s)

8. The Examiner notes that “The novel invention” remains in the abstract but makes no further requirement on that basis.

9. Applicant's arguments filed September 26, 2005 have been fully considered but they are not persuasive.

The proposition that "Wood does not provide any teaching with respect to the use of reference signals from a detector array to adjust the temperature of the array *per se*" is not consistent with the plain language of the reference. Consider column 1, lines 52-56: "Control leads for the thermoelectric stabilizer also pass through the vacuum chamber and allow for it to be temperature stabilized based on the temperature sensed by the temperature sensor." More specifically, column 2, lines 34-50:

The temperature of the focal plane array is kept constant by a thermoelectric controller 73 which sets the temperature based on the output of a temperature sensor inside the package 10. The temperature at which the array is kept is referred to as a stabilization temperature. For the microbolometers we used, the range at which this has been tested is from zero to 30° C. [sic], although there is no reason much higher or lower stabilization temperatures could not be used.

A line t indicates that temperature information is received by the thermoelectric controller. If the temperature information is what is desired, no signals will be sent over the other lines t_a and t_b . However, in the preferred embodiment the thermoelectric controller will be controlled by sending power over either line t_a or t_b depending on the direction (warmer or cooler) of the desired change in temperature.

Therefore, when the temperature sensor of Wood is fabricated on the focal plane array chips, is polled by the focal plane readout electronics in the same way as the microbolometers, and sends temperature data to the image processor in the same way as the microbolometer signals, the conclusion that reference signals from the detector array 30 are used to adjust the temperature of the array *per se* by the operation of means 20 is well-founded.

For at least the reasons explained above, Applicant is not entitled to a favorable determination of patentability in view of the arguments submitted September 26, 2005.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Constantine Hannaher whose telephone number is (571) 272-2437. The examiner can normally be reached on Monday-Friday with flexible hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov/>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ch


Constantine Hannaher
Primary Examiner